

Action Research

TRASH (Transformation and Resilience towards Advancing Sustainable Habits) Project: A Waste Management Classroom Innovation for Young Eco-Champions

Marridel L. Piedad¹, Nancy T. Rubin²

¹ Administrative Officer II, Camp Evangelista Elementary School, Cagayan de Oro City, Philippines

² Master Teacher II, Balubal Elementary School, Cagayan de Oro City, Philippines

ARTICLE INFORMATION

Article History

Received: 18 April 2024
Revised: 30 May 2024
Accepted: 23 July 2024

Correspondence:

Nancy T. Rubin
Nancyrubin1006@gmail.com

Abstract

This study examined the impact of the TRASH Project, a classroom-based innovation designed to promote proper waste management habits among Grade 2 learners. Qualitative data were collected from teachers, parents, and students involved in the program. Thematic analysis revealed positive outcomes across all participant groups. Teachers observed a significant reduction in classroom waste and the development of proper waste disposal habits among students. Parents reported that these habits extended to the home environment, demonstrating the program's ability to foster long-term behavioral change. Students expressed a newfound sense of environmental responsibility and appreciation for the program, indicating the potential for cultivating a love for the environment. Through achieving its core objectives of promoting waste management habits, environmental awareness, and reduced classroom litter, the TRASH Project demonstrates promise in fostering responsible waste management practices in young learners. While the qualitative data provides valuable insights, future research will incorporate quantitative methods for a more comprehensive evaluation. The project's scope will be expanded to encompass the entire school, and its content will be further refined based on the findings. Additionally, new waste management innovations will be developed, and future evaluations will employ both quantitative and qualitative assessments to ensure program improvement and generalizability.

Keywords: Action research, qualitative study, thematic analysis, waste disposal habits, waste management

Cite as:

Piedad, M.L., & Rubin, N.T. (2024). TRASH (Transformation and Resilience towards Advancing Sustainable Habits) Project: A Waste Management Classroom Innovation for Young Eco-Champions. *Balangkas*, 1(1), 33-40.

Introduction

The issue of waste management has become a growing concern globally (World Bank Group, 2022; Princy 2021). With the increasing population and rapid urbanization, the amount of waste generated has reached alarming levels, putting immense pressure on landfills and natural ecosystems (Global Waste Management Outlook, 2015). Improper waste disposal has led to environmental pollution, health hazards, and the depletion of natural resources (Global Waste Management Outlook, 2015).

In the Philippine context, Republic Act 9003, also known as The Ecological Solid Waste Management Act, requires the Philippine National Government, in coordination with the Department of Education (DepEd) and other educational institutions, to conduct an ongoing education and information campaign on Solid Waste Management (SWM) Practices. This campaign aims to strengthen the integration of environmental concerns into school curricula, focusing on waste management principles such as segregation at source, reduction, recycling, reuse, and composting. The goal is to promote environmental awareness and action among the citizens, leading to increased awareness of SWM Practices among the general public.

Solid Waste Management (SWM) encompasses the collection, transport, disposal, and treatment of waste materials, with a focus on minimizing its impact on health, environment, and aesthetics (Paghasian, 2017). Recognizing the consequences of improper waste management, practicing waste characterization and segregation at source, proper collection and transfer, recycling, and composting are mandated by the law to prevent garbage crisis (Aquino, et al., 2013). Alongside growing awareness, equal attention should be given to proper implementation.

In the case of a Public Elementary School in the Division of Cagayan de Oro City, Philippines, it was unavoidable to see learners throwing minute trash in classrooms. These trashes include straws or peelings from their snacks. Even if these trashes seemed to be very little, not reprimanding learners on these simple actions may lead to lack of discipline in waste management once they grew older.

Given that the institution upholds their commitment of molding learners to champion environmental advocacies and legacies and to support RA 9003, this innovation—TRASH Project, was conceived.

Objectives

The TRASH project aims to develop a sustainable habit for young learners on waste management. Specifically, it aims to:

1. Develop a discipline and a habit of proper waste management disposal among the learners;
2. Develop a sense of loving the environment by a simple act of keeping trashes inside instead of carelessly throwing them anywhere; and
3. Lessen trash inside the classroom.

Methods

Project Description

TRASH Project is an innovation crafted to develop proper waste management habits among Grade 2 learners. As young as the minds of these children, a seed for loving the environment should be cultivated.

To do this, the innovator talked to Grade 2 teachers and asked them to implement the innovation in their classrooms. The innovation was conducted at this grade level since the class advisers observed that the learners seemed to not mind minute trashes.

The innovator gave a simple orientation on the innovation. First, there wouldn't be any trash bins in the classrooms. Next, whenever the learners have trash, they should keep it and bring it home. Then, the teachers instruct the learners that this trash, once they get home, should be thrown to their houses' material recovery facility or garbage cans. The teachers should note her observations on the behavior of the learners regarding the implementation of the program.

After 2 months of the implementation, the innovator conducted an informal interview with the teachers, learners, and parents to evaluate the program.

Beneficiary Description

The beneficiary of this innovation includes the Grade 2 pupils of a Public Elementary School in the Division of Cagayan de Oro. This Grade level is composed of six sections. All these sections are composed of heterogeneous learners from Barangay Patag, and nearby barangays around Cagayan de Oro City.



Links with Other Programs/Activities

This TRASH Project is anchored in the school's Program, Solid Waste Management, found in the Annual Improvement Plan (AIP) for the school year 2022-2023.

Project Sustainability

The innovation was implemented from March to May 2023 for Grade 2 learners. With the positive result, the innovator plans to extend the implementation to the other grade levels with the same public school as the locale of implementation. This is planned to be implemented at the start of SY 2023-2024. A program evaluation will be conducted at the end of the implementation to assess and improve the program. This cycle will then continue. Through this, the sustainability of the innovation can be assured.

Risk Management

The start of the implementation was challenging to the class advisers of each section, given that the learners are still adjusting on the policy. After a week or so, the learners became used to the innovation.

Results and Discussions

To evaluate the program, the innovator conducted an informal interview with the teachers, learners, and their parents. Below are their responses which are subjected to thematic analysis.

Teachers' Perceptions and Experiences

The teachers expressed their perceptions, experiences, and observations of the learners' behavior after the program was implemented. Two themes emerged from their responses.

Theme 1: Absence of Trash inside the classroom

According to the teachers, when the TRASH Project was implemented, there was no trash in the classroom anymore. The learners see to it that they keep their trash. This led to a tidy classroom. No more wrappers, straws, or minute peelings that can be found anywhere. Below are their verbatim responses.

"Hinlo na ang room. Wala nay mga basura basura. Kabalo na ang mga bata nga dili sila basta basta maglabay og basura." [The classroom is tidy. The children already know that they shouldn't throw trash anywhere.]

"Nice kayo sa feeling nga kabalo na ang mga bata nga i-keep ilang basura. Wala nay mga wrappers nga makita sa salog." [It's very nice that the children keep their trash. No more wrappers on the floor.]

Teachers involved in the TRASH Project reported a significant decrease in classroom litter after program implementation. This aligns with research highlighting the positive impact of environmental education on student behavior. Studies demonstrate that programs promoting student participation in waste reduction strategies lead to positive changes. The teachers' comments reflect their appreciation for the cleaner environment and the students' newfound awareness.

The TRASH Project likely achieved this by incorporating elements that fostered knowledge acquisition about waste management's importance, skill development in waste reduction and disposal, and a shift towards positive environmental values. This aligns with a study that found that programs combining knowledge with practical activities and values cultivation lead to longer-lasting behavioral changes. For instance, the teachers reported that the classroom environment became tidy, with no more wrappers, straws, or minute peelings scattered around. This is supported by Aguirre (2019), who stated that environmental awareness and education are key approaches to solid waste management. The teachers' comments also highlighted the students' newfound responsibility to keep their trash, which is consistent with Debrah et al.'s (2021) finding that formal education can raise awareness of solid waste management.

Theme 2: Development of habit of proper waste management

Another observation observed by the teachers is that the learners developed a habit of proper waste management. A teacher stated that she doesn't have to remind them and the learners automatically do the tasks. Another teacher stated that the innovation is a good practice for the young learners. Shown are their responses.

"Dili na gapataka og labay ang mga bata sa ilang basura. Gina-keep na nila dayun sa mga materials recovery facility sa ilang balay na nila ginalabay. This is a good practice for them as early as their young age." [The children don't throw trashes anywhere anymore. They keep them and throw them in the material recovery facility at home.]

"Bisag 2 months na, still, gapadayun gyapon ang mga nata og keep sa ilang trash. Dili na nako kailangan magpa"



remind". [Even after 2 months, the children still keep their trash. I don't have to remind them.]

The TRASH Project yielded another promising outcome: the development of a proper waste management habit among students. Teachers observed a shift from needing constant reminders to students automatically practicing proper disposal, indicating the formation of a long-term behavioral change. This aligns with research by Kollmuss and Agyeman (2002), who emphasize the importance of environmental education fostering habits, not just knowledge. The teachers' comments further highlight the program's sustainability, with students continuing proper practices even two months after program implementation. This resonates with Jensen and Schnack (1997), who found that combining knowledge with practical activities and fostering values leads to lasting changes.

Teachers' Perceptions and Experiences

The parents, as well, have their observations and perceptions of their children's behavior regarding the TRASH Project. Their responses are themed into the following:

Theme 1: Development of habit of proper waste management

Just like the teachers, the parents noticed that their children developed a habit for proper waste management. A parent stated that they were puzzled about what their children did. Even then, a parent considered the intervention as a good practice to develop good values among the learners in proper waste management and in taking care of the environment. They responded as follow:

"Natingala gani ko nganung gadala-dala sya og basura. Ana siya nga wrapper daw to sa iyang biscuit. Ilabay daw niya sa saktong labayanan." [I was puzzled why my child brought trash. It was accordingly the wrapper of her biscuit. She said that she would throw it in the proper bins.]

"Good practice sya kay makabalo ang mga bata sa saktong pamatasan sa paglabay sa basura ug sa saktong pag atiman sa kinaiyahan." [This is a good practice that the children know good values in garbage disposal and in taking care of the environment.]

Parents' observations in the TRASH Project mirrored those of the teachers - a development of proper waste management habits in their children. This finding, beyond echoing the program's success within the classroom, suggests the program's ability to transcend its immediate environment. Parents reported

noticing their children practicing proper waste disposal behaviors learned at school, even at home. This aligns with research by Kollmuss and Agyeman (2002), who found environmental education programs fostering behavior change in specific contexts (classroom) can lead to generalization of those behaviors to other contexts (home). The surprise and appreciation expressed by parents suggest potential for increased parental support in reinforcing these habits at home. This resonates with Sibbel (2009), who emphasizes the crucial role of collaboration between schools and families in environmental education programs. Parental involvement strengthens the program's impact and facilitates long-term behavioral change. Further research could explore specific program elements that fostered this habit transfer and the extent of parental involvement in reinforcing these behaviors at home. The observed extension of proper waste management habits beyond the classroom strengthens the TRASH Project's potential for long-term impact, highlighting its ability to foster a culture of environmental responsibility within families.

Theme 2: Sustainability of good habits

Just as the parents observed the development of good habits, it was also notable that these habits have been sustained not only in the classroom but also in their homes. Parents claimed that even at home the learners are not throwing trash everywhere. A parent stated that the learner even scolded her sister whenever the latter threw trash anywhere.

"Na-adopt na niya nga habit, kai bisag diri sa balay, dili na sya gapatakag labay." [She (the child) adopted the habit that even at home she doesn't throw garbage everywhere.]

"Nabantayan nako sa akong anak nga conscious na kayo sya sa basura. Siya pa man gani ang mubadlong sa iyang ate kung dili masaktog og labay ang basura." [I observed that my child is so conscious on the trashes. She even scolded her older sister for not throwing her trashes properly.]

Parents' observations extended beyond simply noticing the development of proper waste management habits in their children. Theme 2 highlights the sustainability of these habits, evident in the children's behavior at home. This is a significant finding as it suggests the TRASH Project fostered long-lasting change.

The quotes demonstrate that children are not just practicing proper waste disposal but also taking initiative to influence their



siblings' behavior. This indicates a potential ripple effect within families, where positive environmental habits learned at school can spread and become the norm at home. This aligns with research by Kollmuss and Agyeman (2002), who found that environmental education programs fostering student leadership and peer-to-peer influence can lead to more sustainable behavior change, not just within the individual but also within their social circles.

The findings from the TRASH Project also resonate with a study by Damerell et al. (2013), which found that child-oriented environmental education programs can have a positive influence on adult environmental knowledge and household behaviors. Damerell et al. (2013) observed a "ripple effect" where children's participation in environmental education programs resulted in changes in their parents' environmental attitudes and actions. Parental involvement and reinforcement of the lessons learned by children at home were a key factor in sustaining the behavioral changes (Damerell et al., 2013). This provides additional evidence of the importance of school-family collaboration in environmental education programs to maximize their long-term impact and behavioral change.

Learners' Perceptions and Experiences

The parents, as well, have their observations and perceptions of their children's behavior regarding the TRASH Project. Their responses are themed into the following:

Theme 1: Sense of loving the environment

The learners developed a sense of loving the environment because of the innovation. One of the learners stated that everyone should love the environment to avoid heavy rain. While the learner used the term "rain", it may refer to other disasters and calamities, specifically typhoons that Philippines experience yearly. It is noteworthy that young children are aware of the disasters caused by not caring about the environment. Below are their verbatim answers:

"Dapat i-love ang environment para dili mag-sigeg ulan."
[We should love the environment to avoid heavy rains.]

"Dapat i-protect si mother nature, maong dili dapat magpataka og labay sa basura." [Mother nature should be protected, and so we should not throw garbage anywhere.]

The TRASH Project's impact extended beyond just behavior change. Theme 1 of the learners' perceptions highlights the development of a sense of loving the environment. This

emotional connection is crucial for fostering long-term environmental responsibility.

The student quotes demonstrate an understanding that caring for the environment is not just about avoiding immediate consequences like heavy rain, but also about protecting "Mother Nature" from harm. This aligns with research by Chawla and Cushing (2007), who found that environmental education programs that cultivate positive emotional connections with nature can lead to more sustainable behavior change in the long run.

Although the student specifically mentions rain, it can be interpreted as a broader concern for environmental disasters like typhoons, which are a frequent reality in the Philippines. This suggests the program may have fostered an awareness of the link between human actions and environmental problems, as supported by studies on environmental education and systems thinking (Fazey et al., 2018; Senge, 2006).

Theme 2: Sense of appreciation

Learners also expressed gratitude for being appreciated for their positive habits. The learners are appreciated both by their parents and teachers. Following are their answers:

"Giignan ko ni teacher nga good girl daw ko kay gina-keep nko ako basura." [My teacher told me that I am a good girl because I just keep my trash.]

"Ana si mommy, good daw nga kabalo nko where to throw garbage." [Mommy said that I am good because I know where to throw trash.]

The TRASH Project's impact went beyond just fostering positive behavior and environmental awareness. Theme 2 of the learners' perceptions highlights the development of a sense of appreciation. This sense of appreciation, fueled by positive reinforcement from teachers and parents, can be a powerful motivator for sustaining these behaviors.

The importance of fostering appreciation and intrinsic motivation is further supported by a study by Chawla and Cushing (2007), who emphasized that environmental education programs should focus on cultivating positive emotional connections with nature. They found that this can lead to more sustainable behavior change compared to programs that solely focus on imparting knowledge (Chawla & Cushing, 2007).

Additionally, research by Janmaimool and Khajohnmanee (2019) suggests that environmental system knowledge, which



helps students understand the interconnectedness of environmental issues, can promote more positive environmental attitudes and behaviors. Incorporating this systems-level understanding into the TRASH Project may have contributed to the development of students' sense of appreciation for environmental protection.

Common Themes from the Participants' Responses

While it can be observed that a common theme emerged on teachers' and parents' responses, there are other themes generated from the participants' answers. By cross-analyzing their responses, three (3) common themes are presented below.

Theme 1: Development of habit of proper waste management

The teachers and parents expressed the development of the habit of proper waste management among the learners. The verbatims are as follows:

"Dili na gapataka og labay ang mga bata sa ilang basura. Gina-keep na nila dayun sa mga materials recovery facility sa ilang balay na nila ginalabay. This is a good practice for them as early as their young age." [The children don't throw trashes anywhere anymore. They keep them and throw them in the material recovery facility at home.] —**Parent 1**

"Hinlo na ang room. Wala nay mga basura basura. Kabalo na ang mga bata nga dili sila basta basta maglabay og basura." [The classroom is tidy. The children already know that they shouldn't throw trash anywhere.] —**Teacher 1**

Both teachers (Teacher 1) and parents (Parent 1) observed a significant change in students' waste management behavior. Students not only avoided littering in the classroom but also practiced proper disposal at home. The study by Debrah et al. (2021) supports the idea that raising awareness on solid waste management through formal education can lead to more sustainable practices.

Furthermore, Janmaimool and Khajohnmanee (2019) emphasize the importance of environmental system knowledge in promoting pro-environmental attitudes and behaviors. The TRASH Project's focus on understanding the broader impacts of waste likely contributed to the observed behavioral changes both in the classroom and at home.

The findings also resonate with Hoang and Kato's (2016) research, which demonstrated that environmental education

programs can effectively change students' knowledge and interest in solid waste management activities over time. The positive reinforcement and collaboration between the school and families, as highlighted in the search results, may have further strengthened the long-term adoption of these waste management behaviors.

Theme 2: Development of sense of loving the environment

While the learners developed a sense of loving the environment, this development has also been observed by the parents. Below are their responses:

"Dapat i-protect si mother nature, maong dili dapat magpataka og labay sa basura." [Mother nature should be protected, and so we should not throw garbage anywhere.]

—**Learner 1**

"Permi sya ga ingon nga ang paglabay sa basura sa sakto nga labayanan, usa ka paagi sa pag-love sa environment." [My child always said that properly disposing trash is a way of loving the environment.] —

Parent 2

This theme emerged from student and parent responses (Learner 1 & Parent 2). Students developed a sense of environmental responsibility, recognizing the importance of protecting "Mother Nature" through proper waste disposal. This aligns with research by Chawla and Cushing (2007), who found that environmental education programs that cultivate positive emotional connections with nature can lead to more sustainable behavior change.

The students' understanding of the importance of protecting the environment resonates with the findings of Aguirre (2019), who emphasized that environmental awareness and education are key approaches to improving solid waste management. Aguirre's study highlights the crucial role of fostering environmental consciousness among students as a foundation for promoting sustainable waste disposal practices.

The development of this sense of environmental responsibility and appreciation for nature aligns with the research by Hoang and Kato (2016), who demonstrated that environmental education programs can effectively change students' knowledge, interest, and behaviors related to solid waste management over time. The positive reinforcement and collaboration between the school and families, as highlighted in the search results, may have further strengthened the long-term adoption of these environmentally responsible behaviors.



Theme 3: Aspiration for more waste disposal projects

It can be noted that the three groups of participants liked the innovation which is evident in their positive responses. Moreover, they all expressed their aspirations for more waste disposal projects. They responded as follow:

“Akong gipanghinaot nga daghan pa unta ingon ani nga projects nga ma-implement as innovation diri sa school. It teaches the learners the values of caring for the environment.” [I hope that there will be more projects similar to this that will be implemented in the school.] —

Teacher 2

“Ganahan ko ani nga project. Unta daghan pa og in-ani. Matudloan ang mga bata mahitungod sa paghipos sa basura, ug matudloan sa paghigugma sa kinaiyahan.” [I like this project. Hoping that there would be more projects like this. The children are taught how to keep their trash and how to love the environment.] —**Parent 3**

“Ganahan ko kay ganahan si mommy nga kabalo na daw ko maglabay og trash properly. Tudloan pa unta ko ni teacher og more pa para ma-protect ang environment ug ganahan c mommy.” [My Mother likes that I now know how to dispose of trash properly. I hope that teacher will teach us more ways to protect the environment such that mother will like it again.] —**Learner 2**

A positive sentiment regarding the project was expressed by all participants. Teachers and parents advocated for implementing similar projects, while students expressed a desire to learn more about environmental protection. This enthusiasm suggests the project's potential for long-term impact and fostering a culture of environmental stewardship.

The teachers' and parents' support for expanding the project aligns with research by Aguirre (2019), who emphasized the importance of environmental awareness and education as key approaches to improving solid waste management. Aguirre's study highlights the crucial role of fostering environmental consciousness among students and the community as a foundation for promoting sustainable practices.

Furthermore, the students' eagerness to learn more about environmental protection resonates with the findings of Janmaimool and Khajohnmanee (2019), who found that developing environmental system knowledge can promote more positive environmental attitudes and behaviors. Providing students with opportunities to deepen their understanding of

environmental issues is likely to strengthen their commitment to taking action.

The participants' overall enthusiasm for the project is supported by research from Hoang and Kato (2016), who demonstrated that environmental education programs can effectively change students' knowledge, interest, and behaviors related to solid waste management over time. The positive reinforcement and collaboration between the school and families, as highlighted in the search results, may have further strengthened the participants' engagement and desire to continue their environmental stewardship efforts.

Additionally, a study by Debrah et al. (2021) reviewed the evidence on raising awareness about solid waste management through formal education in developing countries. The review emphasizes the importance of incorporating environmental education into the curriculum to foster sustainable waste management practices among students and the broader community. The enthusiasm expressed by the participants in the TRASH Project suggests that it aligns with this approach and has the potential to serve as a model for other schools and communities.

Conclusion and Implication

The study revealed various themes from the answers of the participants. From the Teachers' perspectives these are (a.) Absence of Trash inside the classroom and (b.) Development habits of proper waste management. From the Parents' perspectives, these are (a.) Development of habits of proper waste management and (b.) Sustainability of good habits. From Learner's perspective, these are (a.) Sense of loving the environment and (b.) Sense of appreciation. By cross-analyzing the responses, three (3) themes are generated: (a.) Development of habits of proper waste management, (b.) Development of a sense of loving the environment, and (c.) Aspiration for more waste disposal projects.

Looking back at the objectives of this innovation, which include the development of a habit of proper waste management disposal, the development of a sense of loving the environment, and lessening trash inside the classroom, it can be inferred that the program has been effective. The objectives are achieved and even developed appreciation among the participants, leading them to aspire for more innovations. However, as much qualitative analysis provides new insights on the effectiveness



of the innovation, it would have been better if a quantitative evaluation was done to support the qualitative result.

Hence, the innovator plans to expand the scope of the present innovation and conduct it to the whole school. Also, the innovator plans to incorporate other aspects on the TRASH Project to make it more effective. Moreover, more innovations on proper waste management will be conceptualized, just as the participants suggested. Lastly, both quantitative and qualitative assessment will be done on the evaluation to provide a much comprehensive result for the improvement of the program and to assure generalizability.

Acknowledgment

The researchers thank the Principal of the institution where the intervention was conducted for her support.

References

- Aguirre, M. L. C. (2019). Environmental Awareness and Education: A Key Approach to Solid Waste Management. *IASPER Interdisciplinary Research Journal*, 10, 1-11.
- Aquino, A., Deriquito J.A., & Festejo, M. (2013). Ecological Solid Waste Management Act: Environmental Protection Through Proper Solid Waste Practices. <https://ap.fftc.org.tw/article/588>
- Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behavior. *Environmental Education Research*, 13(4), 437–452. <https://doi.org/10.1080/13504620701581539>
- Damerell, P., Howe, C., & Milner-Gulland, E. J. (2013). Child-orientated environmental education influences adult knowledge and household behaviour. *Environmental Research Letters*, 8(1), 015016. <https://doi.org/10.1088/1748-9326/8/1/015016>
- Debrah, J. K., Vidal, D. G., & Dinis, M. a. P. (2021). Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling*, 6(1), 6. <https://doi.org/10.3390/recycling6010006>
- Fazey, I., Schöpke, N., Caniglia, G., Patterson, J., Hultman, J., Van Mierlo, B., Säwe, F., Wiek, A., Wittmayer, J., Aldunce, P., Waer, H. A., Battacharya, N., Bradbury, H., Carmen, E., Colvin, J., Cvitanovic, C., D'Souza, M., Gopel, M., Goldstein, B., . . . Wyborn, C. (2018). Ten essentials for action-oriented and second order energy transitions, transformations and climate change research. *Energy Research & Social Science*, 40, 54–70. <https://doi.org/10.1016/j.erss.2017.11.026>
- Hoang, T. T. P., & Kato, T. (2016). Measuring the effect of environmental education for sustainable development at elementary schools: A case study in Da Nang city, Vietnam. *Sustainable Environment Research*, 26(6), 274–286. <https://doi.org/10.1016/j.serj.2016.08.005>
- Janmaimool, P., & Khajohnmanee, S. (2019). Roles of environmental system knowledge in promoting university students' environmental attitudes and Pro-Environmental behaviors. *Sustainability*, 11(16), 4270. <https://doi.org/10.3390/su11164270>
- Jensen, B. B., & Schnack, K. (1997b). The Action Competence approach in environmental education. *Environmental Education Research*, 3(2), 163–178. <https://doi.org/10.1080/1350462970030205>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Paghasian, M. C. (2017). Awareness and Practices on Solid Waste Management among College Students in Mindanao State University Maigo School of Arts and Trades. *Proceedings of the 3rd International Conference on Education and Training (ICET 2017)*, 128, 5-12. <https://doi.org/10.2991/icet-17.2017.2>
- Princy, A. J. (2024, July 31). Global Waste Management: Towards a world of no waste. *Research Dive*. <https://www.researchdive.com/blog/global-waste-management-towards-a-world-of-no-waste>
- Senge, P.M. (2006) *The Fifth Discipline: The Art and Practice of the Learning Organization*. Doubleday (A Division of Random House), New York, 7.
- Global Waste Management Outlook. (2015). UNEP - UN Environment Programme. <https://www.unep.org/resources/report/global-waste-management-outlook>
- World Bank Group. (2022). Solid waste management. In *World Bank*. <https://www.worldbank.org/en/topic/urbandevelopment/brief/solid-waste-management>